off head of each pump that meets §157.126(b).

(e) Each overpressure relief valve must discharge into the suction side of a pump that meets §157.126(b).

(f) The piping and equipment of a COW system may not be in machinery spaces.

(g) Each hydrant valve for water washing in the piping of a COW system must:

(1) Have adequate strength to meet 46 CFR Part 56 for the working pressure for which the system is designed; and

(2) Be capable of being blanked off.

(h) Each sensing instrument must have an isolating valve at its connection to the piping of the COW system, unless the opening to that connection is 0.055 inches (1.4 millimeters) or smaller.

(i) If the washing system for cargo tanks has a steam heater used when water washing, it must be located outside the engine room and must be capable of being isolated from the piping of the COW system by:

(1) At least two shut-off valves in the inlet piping and at least two shut-off valves in the outlet piping; or

(2) Blank flanges identifiable as being closed (e.g., spectacle flanges).

(j) If the COW system has a common piping system for oil washing and water washing, that piping system must be designed to drain the crude oil into a slop tank or a cargo tank.

(k) The piping of a COW system must be securely attached to the tank vessel's structure with pipe anchors.

(l) When COW machines are used as pipe anchors, there must be other means available for anchoring the piping if these machines are removed.

(m) There must be a means to allow movement of the COW system piping as a result of thermal expansion and flexing of the tank vessel.

(n) The supply piping attached to each deck mounted COW machine and each COW machine that is audio inspected under §157.155(a)(4)(ii) must have a shut-off valve.

(o) On combination carriers, piping of the COW system installed between each COW machine located in a cargo tank hatch cover and an adjacent location just outside the hatch coaming, may be flexible hose with flanged connections that is acceptable by the Commandant.

§157.124 COW tank washing machines.

(a) COW machines must be permanently mounted in each cargo tank.

(b) The COW machines in each tank must have sufficient nozzles with the proper diameter, working pressure, movement, and timing to allow the tank vessel to pass the inspections under §157.140.

(c) Each COW machine and its supply piping must be supported to withstand vibration and pressure surges.

(d) There must be one portable drive unit available on board the vessel for every three COW machines that use portable drive units during COW operations required by §157.160 before each ballast voyage.

(e) Except as allowed in paragraph (f) of this section, each cargo tank must have COW machines located to wash all horizontal and vertical areas of the tank by direct impingement, jet deflection, or splashing to allow the tank vessel to pass the inspections under §157.140. The following areas in each tank must not be shielded from direct impingement by large primary structural members or any other structural member determined to be equivalent to a large primary structural member by the Commandant when reviewing the plans submitted under §157.100 or §157.102:

(1) 90 percent or more of the total horizontal area of the:

(i) Tank bottom;

(ii) Upper surfaces of large primary structural members; and

(iii) Upper surfaces of any other structural member determined to be equivalent to a large primary structural member by the Commandant.

(2) 85 percent or more of the total vertical area of the tank sides and swash bulkheads.

(f) Each cargo tank on a vessel having a COW system under §157.10a(a)(2) or §157.10c(b)(2) with complicated internal structural members does not have to meet paragraph (e) of this section if the following areas of each cargo tank are washed by direct impingement and the tank vessel can pass the inspections under §157.140:

(1) 90 percent or more of the total horizontal area of all the:

(i) Tank bottoms;

(ii) Upper surfaces of large primary structural members; and

(iii) Upper surfaces of any other structural member determined to be equivalent to a large primary structural member by the Commandant.

(2) 85 percent or more of the total vertical area of all the tank sides and swash bulkheads.

(g) Each single nozzle COW machine that is mounted to the deck must have a means located outside of the cargo tank that indicates the arc and rotation of the movement of the COW machine during COW operations.

(h) Each multi-nozzle COW machine that is mounted to the deck must have a means located outside of the cargo tank that indicates the movement of the COW machine during COW operations.

(i) Each COW machine mounted to or close to the bottom of a tank without a means located outside of the cargo tank that indicates movement of the machine must not be programmable.

NOTES: 1. In the calculations to meet §157.124 (e) or (f), areas that are shielded from direct impingement by structural members other than large primary structural members or swash bulkheads can be calculated as areas being washed by direct impingement.

2. One or more types of COW machines could be used to meet §157.124 (e) or (f).

[CGD 77–058b, 45 FR 43709, June 30, 1980, as amended by CGD 82–28, 50 FR 11627, Mar. 22, 1985]

§157.126 Pumps.

(a) Crude oil must be supplied to the COW machines by COW system pumps or cargo pumps.

(b) The pumps under paragraph (a) of this section must be designed and arranged with sufficient capacity to meet the following:

(1) A sufficient pressure and flow is supplied to allow the simultaneous operation of those COW machines designed to operate simultaneously.

(2) If an eductor is used for tank stripping, enough driving fluid is provided by the pumps to allow the eductor to meet §157.128(a).

(c) There must be means on the tank vessel to maintain the pressure under paragraph (b) of this section when shore terminal back pressure is less than the pressure under paragraph (b) of this section.

(d) The COW system must have two or more pumps that are capable of supplying oil to the COW machines.

(e) The COW system must be designed to meet the requirements of this subpart with any one pump not operating.

§157.128 Stripping system.

(a) Each tank vessel having a COW system under §157.10(e), §157.10a(a)(2), or §157.10c(b)(2) must have a stripping system that is designed to remove crude oil from—

(1) Each cargo tank at 1.25 times the rate at which all the COW machines that are designed to simultaneously wash the bottom of the tank, are operating; and

(2) The bottom of each tank to allow the tank vessel to pass the inspection under §157.140(a)(2).

(b) Each cargo tank must be designed to allow the level of crude oil in the tank to be determined by:

(1) Hand dipping at the aftermost portion of the tank and three other locations; or

(2) Any other means accepted by the Commandant.

(c) Each stripping system must have at least one of the following devices for stripping oil from each cargo tank:

(1) A positive displacement pump.

(2) A self-priming centrifugal pump.

(3) An eductor

(4) Any other device accepted by the Commandant.

(d) There must be a means in the stripping system piping between the device under paragraph (c) of this section and each cargo tank to isolate each tank from the device.

(e) If the stripping system has a positive displacement pump or a self-priming centrifugal pump, the stripping system must have the following:

(1) In the stripping system piping:

(i) A pressure gauge at the inlet connection to the pump; and

(ii) A pressure gauge at the discharge connection to the pump.

(2) At least one of the following monitoring devices to indicate operation of the pump.

(i) Flow indicator.